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MINISTRY OF SUPPLY

# AEROPLANE AND ARMAMENT EXPERIMENTAL ESTABLISHMENT

BOSCOMBE DOWN

EXCLUDED FROM GENERAL DECLASSIFICATION SCHEDULE  
EXECUTIVE ORDER 11852

SHACKLETON MR. MK.2 WG.530  
(4 GRIFFON 57)

ACCEPTANCE TRIALS OF 1.75 INCH DISCHARGER INSTALLATION

REVIEW ON *[Signature]*

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18th Part of Report No. AAEE/866/1

AEROPLANE AND ARMAMENT EXPERIMENTAL ESTABLISHMENT  
BOSCOMBE DOWN

-9. MAR. 1954

Shackleton MR. Mk.2 WG.530  
(4 Griffon 57)

Acceptance trials of 1.75 inch discharger installation

A. & A.E.E. Ref: AAEE/5909/7  
M. O. S. Ref: S.B./61894/R.D.Arm.2  
Period of Trial: February 1953 - January 1954

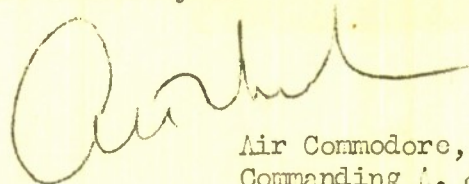
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Report No.	Title	
13th Part AAEE/866/1	WG.530	Carriage and release of T.1946(BR) directional sonobuoys carried on Avro 100/1000 lb. standard Mk.1 B/AN carriers
14th - do -	WG.532	Normal accelerations during certain Anti-Submarine attacks.
15th - do -	VW.126	Assessment of directional wander on the prototype MR. Mk.2 aircraft.
16th - do -	WG.530	Assessment leading edge spoiler as stall warning device.
17th - do -	WG.530	Acceptance trials of Avro sonobuoy carriers six store, front and rear.

Summary

1. Acceptance trials of the 1.75 inch Discharger Installation on Shackleton MR. Mk.2 aircraft have been completed.
2. It is recommended that the 1.75" Discharger be accepted for Service use, and the installation on the Shackleton M.R. Mk.2 aircraft be cleared for firing at speeds up to 250 knots I.A.S. at all altitudes, with a fabric patch in position as suggested in paragraph 7.1. of this report.

This report is issued with the authority of



Air Commodore,  
Commanding A. & A.E.E.

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1. Introduction

1.1. Acceptance trials of the 1.75 inch Discharger installation on Shackleton MR. Mk.2 aircraft, using Cartridges Illuminating No. 1, Mk.1, as requested in M.O.S. letter S.B./61894/R.D.Arm.2 dated 7th January, 1952, have been completed.

2. Object of Trial

2.1. To determine the suitability of the installation for service use.

2.2. To comment on the general serviceability and handling of the Cartridge Illuminating No. 1, Mk.1.

2.3. To recommend any modifications to the equipment and store which may be considered necessary.

3. Description of Installation

3.1. The 1.75 inch Discharger Installation

3.1.1. A battery of four six-barrelled 1.75 inch dischargers is installed at the starboard side of the fuselage, just forward of the entrance door. The flares are fired through the fuselage at right angles to the line of flight and 45 degrees upwards from the horizontal. Each discharger is electrically controlled and the interval between firing pulses can be pre-set at half or one second intervals.

3.1.2. A main control box and a cartridge flare distributor, Mk.1, are fitted to a panel immediately above the dischargers. Remote control facilities are provided by STOP-START toggle switches on the pilot's instrument panel. To ensure that the discharge of flares is automatically stopped when the bomb firing switch is operated, the stop switch circuit is connected to the bomb firing circuit through a relay.

3.1.3. Descriptive and operating details for the illuminating flares control box and cartridge flare distributor, Mk.1, are contained in A.P.1095B, Vol. 1, Sect. 6. The 1.75 inch discharger is described in A.P.1641 H, Vol. 1, Chap. 11. A theoretical wiring diagram of the release circuit is contained in A.P. 4267B, Vol. 1, Sect. 5, Chap. 1.

3.2. Stowage of Cartridges

3.2.1. A total of 193 cartridges can be carried, 24 in the discharger barrels and the remainder in stowage compartments immediately forward of the dischargers. A stowage bag for empty cartridges is installed below the dischargers.

3.3. The Cartridge Illuminating No. 1, Mk.1.

3.3.1. The Cartridges Illuminating No. 1, Mk. 1 which were used for the trial are described in A.P. 1661E, Vol. 1. (2nd Edn.) Sect. 5, Chap. 11.

NOTE: Initial tests of this type of installation were made with a Shackleton MR. Mk.1 aircraft using dischargers fitted with tufnol firing pin insulators. These dischargers proved unsatisfactory, and an extremely high failure rate (approximately 20%) was also experienced with the cartridges used on this trial. As a result, the dischargers and cartridges were considered unacceptable and the trial was held in abeyance. Details of the Shackleton MR. Mk.1 installation trial are contained in the 16th Part of Report No. AAME/806 dated 16th June, 1951.

When new dischargers (Stores Ref. 7B/1402) and 192 proof tested cartridges were made available, the trial was re-opened using a Shackleton MR. Mk.2 aircraft installation.



#### 4. Method of Trial

##### 4.1. Ground Examination

4.1.1. The discharger installation was examined and electrically tested at the commencement of the trial.

##### 4.2. Flight Carriage Tests

4.2.1. Flight carriage tests were made at progressive speeds with manoeuvres, to assess the suitability of the cartridge stowage compartments.

##### 4.3. Flight Firing Tests

4.3.1. The discharger installation was operated during flight at progressive speeds up to 250 knots I.A.S., from all firing positions, at both half and one second interval settings.

#### 5. Results of Trial

##### 5.1. Ground Examination

5.1.1. In order to check the functioning of the discharger it was necessary to manufacture a circuit continuity tester (Fig. 1). The body consisted of a Paxolin plate with six steel contact studs wired to an indicator lamp (Stores Ref. 5L/266). Two metal strips were attached to the plate to ensure correct positioning of the tester on the distributor head and to act as an earth for the circuit.

NOTE: It is understood from the servicing instructions in A.P.1641H, Vol. 2, Part 2, Sect. 2, Chap. 11, that a Testers, insulated, 250 volts, test equipment, discharger 1.75 inch (Stores Ref. 5G/152) is to be issued for this purpose.

##### 5.2. Flight Carriage Tests

5.2.1. Flight carriage tests were made at indicated air speeds up to 300 knots with manoeuvres, including rate 2 turns, climbs and dives up to angles of 20 degrees with  $1\frac{1}{2}$  G on pullouts. All cartridges remained firmly positioned in the stowage compartments throughout the tests.

##### 5.3. Flight Release Tests

5.3.1. The installation was operated during flights up to indicated air speeds of 250 knots at altitudes between 700 and 1,500 feet, from all firing positions, at both half and one second intervals.

5.3.2. Of the 192 cartridges fired, 182 functioned satisfactorily, 9 ignited on leaving the discharger barrels and one failed to eject the last flare. In all cases the flares were projected well clear of the aircraft's tail.

5.3.3. To protect the dischargers from damp and rain, the ejection openings in the aircraft fuselage were covered by a fabric patch. Firing tests with the patch in position showed that the cartridges were capable of piercing the fabric with no apparent loss of velocity to the projected flares.

5.3.4. The effects of glare and dazzle were investigated during one night sortie. Crew members stated that they had no difficulty in carrying out their normal duties and did not experience any glare or dazzle after-effects.

#### 6. Conclusions

6.1. It is concluded that, subject to acceptance of the modification mentioned in paragraph 7.1. of this report, the 1.75 inch Cartridge Illuminating and 1.75 inch Discharger installation of the Shackleton MR. Mk.2 aircraft is acceptable for service use within the limitations stated in paragraph 7.1.



7. Recommendations

7.1. Provided a doped fabric patch is fitted over the ejection openings in the aircraft fuselage to protect the dischargers from the wet, it is recommended that:-

- (i) The 1.75 inch Discharger installation of the Shackleton M.R. Mk.2 aircraft be cleared for service use at speeds up to 250 knots I.A.S. at all altitudes, and for firing through the fabric patch.
- (ii) The 1.75 inch Illuminating Cartridge No. 1, Mk. 1 be accepted for service use.

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Locally manufactured Circuit Continuity Tester.

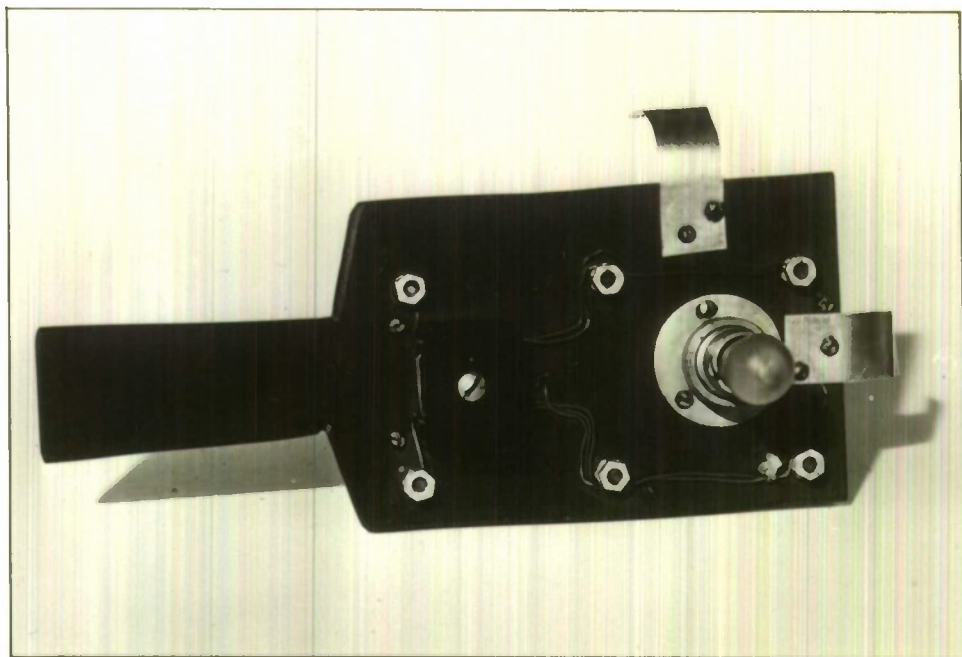


FIG.I.A. Front View.

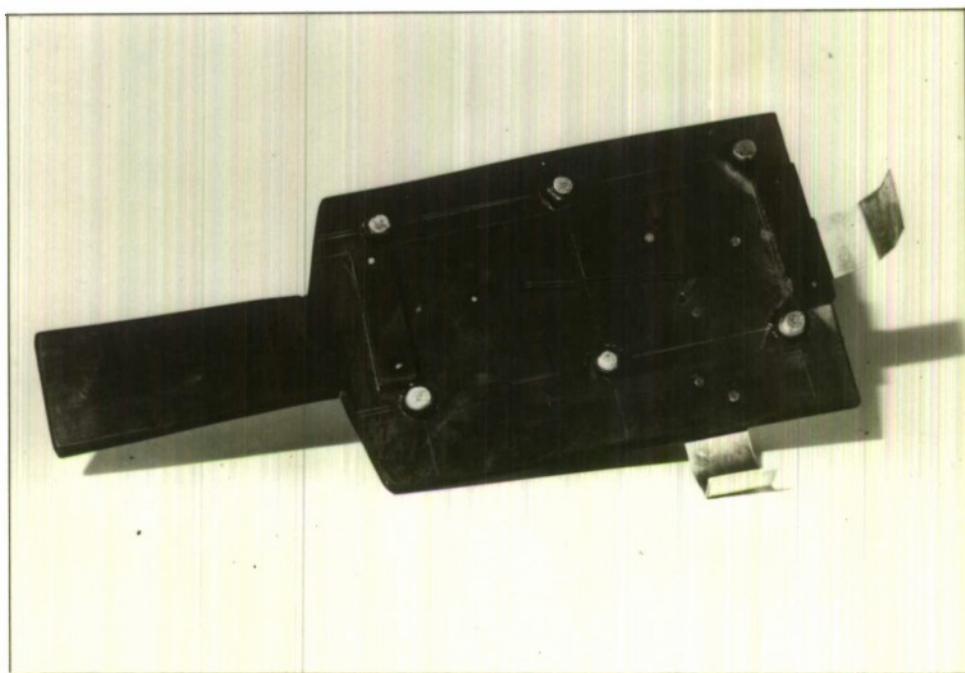


FIG.I.B. Rear View.





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